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## Trial Examination 4

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Duration: 30 minutes

For each question, choose the most suitable option and write the letter (A, B, C or D) in the brackets provided. Each correct answer will score one mark.

1. Which apparatus below are **not** used in the set-up for removing water from magnesium chloride solution?

- 1 Condenser
- 2 Distillation flask
- 3 Filter funnel
- 4 Separating funnel
- 5 Thermometer

- A 1, 2 and 5 only  
 B 1, 3 and 5 only  
 C 2, 3 and 4 only  
 D 3 and 4 only

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2. Two samples of food dyes, **A** and **B**, were analysed using paper chromatography. Figure 1 shows the chromatogram obtained.

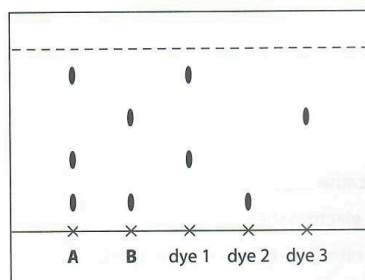


Figure 1

Which of the following statements is **true**?

- A **A** is a compound while **B** is a mixture.  
 B **B** is a compound while **A** is a mixture.  
 C Both **A** and **B** are compounds.  
 D Both **A** and **B** are mixtures.

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3. A mixture of gases was passed through the following set-up in Figure 2.

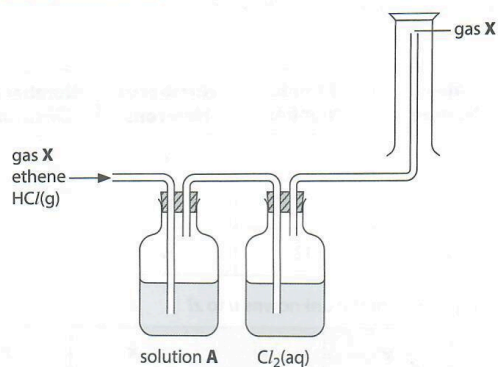


Figure 2

Which of the following statements is **not true** of the set-up above?

- A Ethene reacts with aqueous chlorine.
- B Gas X could be hexane, C<sub>6</sub>H<sub>14</sub>.
- C Gas X could be hydrogen.
- D Solution A could be sodium hydroxide.

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4. Iodine sublimes whereas water evaporates.

Which of the following is most likely **not true** of the state changes of iodine and water?

- A Both substances undergo state changes to form a gas.
- B In both state changes, the intermolecular forces of attraction are overcome.
- C Iodine has weaker covalent bonds as compared to water.
- D The particles of iodine move further apart during sublimation compared to the particles of water during evaporation.

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5. Which of the following shows the **correct** similarity and difference between hydrogen, <sup>1</sup>H, and its isotope, <sup>2</sup>H?

	Similarity	Difference
A	Both nuclei contain neutrons.	<sup>1</sup> H has more neutrons than <sup>2</sup> H.
B	Both nuclei contain the same number of electrons.	<sup>2</sup> H has more neutrons than <sup>1</sup> H.
C	Both nuclei contain the same number of neutrons.	<sup>1</sup> H has more neutrons than <sup>2</sup> H.
D	Both nuclei contain the same number of protons.	<sup>2</sup> H has more neutrons than <sup>1</sup> H.

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6. Table 1 shows information on three ions, **A**, **B** and **C**. Ions **A** and **B** belong to elements which are beside each other in the periodic table. Ions **B** and **C** are isotopes.

Table 1

Particle	Mass Number	Atomic Number	Number of Neutrons	Number of Electrons	Charge
<b>A</b>	23	<i>v</i>	<i>w</i>	<i>x</i>	+1
<b>B</b>	<i>u</i>	<i>w</i>	13	<i>y</i>	<i>z</i>
<b>C</b>	24	12	<i>w</i>	<i>y</i>	<i>z</i>

Which of the following represent the unknowns *u* to *z*?

	<i>u</i>	<i>v</i>	<i>w</i>	<i>x</i>	<i>y</i>	<i>z</i>
<b>A</b>	24	11	12	11	12	+2
<b>B</b>	24	13	11	10	10	+3
<b>C</b>	25	11	12	10	10	+2
<b>D</b>	26	12	13	10	12	+2

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7. Element **X** is from Group 13 whereas element **Y** is from Group 16 of the periodic table.

Which of the following could be **true** of the compound formed between **X** and **Y**?

	Number of Electrons Involved in Bonding	Type of Bonding	Relative Molecular Mass of the Compound
<b>A</b>	3	Covalent	43
<b>B</b>	3	Ionic	59
<b>C</b>	6	Covalent	150
<b>D</b>	6	Ionic	102

( )

8. Alloys are formed primarily to \_\_\_\_\_.

- A** allow the metal to conduct electricity better
- B** make the metal look more appealing
- C** prevent the metal from corroding
- D** strengthen the metal

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9. Some information regarding unknown compounds  $\text{WO}_2$ ,  $\text{XF}_3$ ,  $\text{YC}_l$  and  $\text{Z}(\text{NO}_3)_2$  are given in Table 2.

Table 2

Compound	Number of Moles / mol	Mass / g
$\text{WO}_2$	0.500	22.0
$\text{XF}_3$	0.150	12.6
$\text{YC}_l$	0.400	29.8
$\text{Z}(\text{NO}_3)_2$	0.100	14.8

Arrange **W** to **Z** in **ascending** order of number of valence electrons.

- A** W, X, Z, Y  
**B** W, Y, X, Z  
**C** Y, Z, X, W  
**D** Z, Y, X, W

10. When compound **D** reacts with alkali **E**, gas **F** is formed.

Which of the following could be the formulae of **D**, **E** and **F**?

	D	E	F
<b>A</b>	$\text{Al}_2\text{O}_3$	$\text{NaOH}$	$\text{H}_2\text{O}$
<b>B</b>	$\text{CaO}$	$\text{NH}_3$	$\text{NH}_3$
<b>C</b>	$\text{NH}_4\text{Cl}$	$\text{KOH}$	$\text{HCl}$
<b>D</b>	$(\text{NH}_4)_2\text{SO}_4$	$\text{NaOH}$	$\text{NH}_3$

11. The reaction between ethanoic acid and magnesium can be represented using the following equation.



Which of the following change(s) will produce the **same** observation as the reaction above?

- Copper is used instead of magnesium
  - Ethanoic acid is dissolved in an organic solvent like benzene instead of water
  - Magnesium carbonate is used instead of magnesium
  - Magnesium oxide is used instead of magnesium
- A** 1 and 2 only  
**B** 1 and 4 only  
**C** 2 and 3 only  
**D** 3 only

12. Some experiments were done on substances **D**, **E** and methane. The gases produced from the experiments were tested. Table 3 shows the experiments and the observations of the tests done on these substances.

**Table 3**

Experiment	Procedure	Observation
1	Heat compound <b>D</b> strongly in a test tube.	The gases produced turned damp red litmus paper blue, and then turns it back to red.
2	Burn methane in excess oxygen.	?
3	Add substance <b>E</b> to nitric acid.	?

Which of the following is most likely **not true**?

- A** Damp red litmus paper can be used to identify the gas produced in experiment 2.
- B** If substance **E** is zinc, a burning splint can be used to test for the gas produced.
- C** If substance **E** is zinc carbonate, the gas produced is the same as in experiment 2.
- D** Substance **D** could be ammonium chloride. ( )
13. Which of the following is **not** the correct trend across Period 3 of the periodic table?
- A** The metallic character of the elements decreases
- B** The number of valence electrons of the elements increases
- C** The reactivity of the elements decreases
- D** The tendency to form acidic oxides increases ( )
14. Which of the following ionic equations is **incorrect**?
- A**  $\text{Br}_2 + 2\text{Cl}^- \longrightarrow \text{Cl}_2 + 2\text{Br}^-$
- B**  $\text{Br}_2 + 2\text{I}^- \longrightarrow \text{I}_2 + 2\text{Br}^-$
- C**  $\text{Cl}_2 + 2\text{Br}^- \longrightarrow \text{Br}_2 + 2\text{Cl}^-$
- D**  $\text{Cl}_2 + 2\text{I}^- \longrightarrow \text{I}_2 + 2\text{Cl}^-$  ( )

15. The formula of a compound of sulfur is  $\text{SV}_2$ . It is a gas at room temperature.

Which of the following statements could be **true**?

- 1 Element **V** could be a Group 17 element.
- 2 Element **V** could be sodium.
- 3 The compound contains ions.
- 4 The compound could be a pollutant.

- A 1 and 2 only
- B 1 and 4 only
- C 2 and 3 only
- D 3 and 4 only

( )

16. A displacement experiment was done on some unknown metals, **O**, **P**, **Q** and **R**.



Based on the ionic equations above, which of the following ionic equations is **wrong**?

- A  $\text{Q} + \text{P}^{2+} \longrightarrow \text{Q}^{2+} + \text{P}$
- B  $\text{Q} + 2\text{R}^{+} \longrightarrow \text{Q}^{2+} + 2\text{R}$
- C  $2\text{R} + \text{O}^{2+} \longrightarrow 2\text{R}^{+} + \text{O}$
- D  $2\text{R} + \text{P}^{2+} \longrightarrow 2\text{R}^{+} + \text{P}$

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17. Bioethanol is preferred over conventional fuels like petrol and diesel.

This is because \_\_\_\_\_.

- A it does not produce harmful gases when burnt
- B it is a renewable resource
- C it is easily obtained from petroleum
- D its production incurs low costs

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18. Compounds  $C_2H_x$  and  $C_2H_y$  undergo reactions with bromine as shown below.



Organic compound **M** contains more bromine atoms than organic compound **N**.

Which of the following regarding the above reactions are **correct**?

- 1 A by-product is formed when compound **M** is formed.
  - 2 Both  $C_2H_x$  and  $C_2H_y$  can be obtained from a larger hydrocarbon molecule.
  - 3 The number of hydrogen atoms in organic compound **N** is less than number of hydrogen atoms in organic compound **M**.
  - 4  $y = x + 2$
- A** 1 and 3 only  
**B** 1 and 4 only  
**C** 2 and 3 only  
**D** 2 and 4 only

19. The structure of compound **P** is shown in Figure 3. Compound **P** can undergo polymerisation.

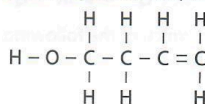


Figure 3

Which of the following statements is/are **true**?

- 1 Carbon-hydrogen bonds are broken during polymerisation.
  - 2 The repeat unit of the polymer is
 
$$\begin{array}{c}
 H \quad H \\
 | \quad | \\
 -C - C- \\
 | \quad | \\
 H \quad H \\
 | \quad | \\
 H - C - H \\
 | \quad | \\
 H - C - H \\
 | \quad | \\
 O \quad H
 \end{array}$$
  - 3 Cracking could be used to break down and recycle the polymer.
  - 4 The public should be educated on the proper disposal and usage of the polymer to prevent more pollution caused by its improper disposal.
- A** 1 only  
**B** 1 and 2 only  
**C** 2, 3 and 4 only  
**D** 3 and 4 only

20. Figure 4 shows the volume of air pollutants produced by a car engine based on the volume of air taken in by the engine.

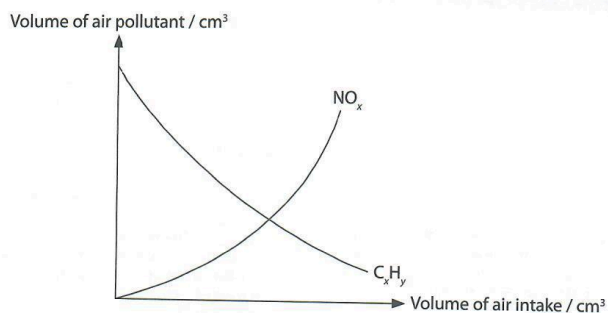


Figure 4

Which of the following statements is/are most likely **true**?

- 1 The graph of carbon monoxide produced would look similar to the graph of nitrogen oxides produced.
  - 2 When the intake of air is high, more complete combustion occurs.
  - 3 When the intake of air is high, the volume of nitrogen oxides removed by catalytic converters decreases.
  - 4 When the intake of air is low, the temperature of engine is low.
- A 1 only  
B 1, 2 and 3 only  
C 2, 3 and 4 only  
D 3 and 4 only